

Name: Barrios, Elizabeth

Education Institution: Wayne State University

Major(s)/Degree/Grad Year: Chemical Engineering with minor in Chemistry/Bachelor's of Science/2013

NASA MSFC Mentor: Dr. Peter A. Curreri

Org Code/Division or Branch: EM 31



Research and Experience

- **NASA USRP Intern**, Kennedy Space Center, FL (Jan.2011-May 2011)
 - Investigated the potential antimicrobial potency of different materials for use in water treatment systems
 - Assisted in making and analyzing hydrogen sensing tape used for deployment at the liquid hydrogen lines during the STS-133 shuttle launch
 - Gained a working understanding for In-Situ Resource Utilization, specifically, metal and oxygen extraction processes from various extraterrestrial regoliths
- **Student for Temporary Employment**, US Army TARDEC, Warren, MI (May 2009-Jan.2011)
 - Developed and conducted a test method to standardize automatic titration methods with the American Society for Testing and Materials (ASTM)
 - Assisted in developing a test for evaluating overall effectiveness of seat cushions to enhance a soldiers field of vision in military vehicles
 - Assisted in research on vehicle seats, restraint systems, and black boxes for military vehicle usability
- **Lab Assistant**, Next Energy – National Biofuels Energy Lab, Detroit, MI (Sep.2009-Feb.2010)
 - Assisted with experiments to test algae growth rates and their oil production rates
 - Prepared and presented data summaries of my work

Membership and Activities

- Tau Beta Pi – The Engineering Honors Society (April 2010-Present)
 - Corresponding Secretary (April 2010-December 2010)
- Alpha Gamma Delta, The International Women's Fraternity (initiated April 2009)
 - Vice President Finance (December 2009-December 2010)
 - Activities Coordinator (April 2009-December 2009)
- American Institute of Chemical Engineers (May 2009-December 2010)
 - Computer Chair (May 2010-December 2010)

Honors and Awards

- College of Engineering Dean's List (2009-2010, 2010-2011)
- Chemistry Chair's Honor's List (2010)
- Tau Beta Pi – The Engineering Honors Society (initiated April 2010)

Title of Poster: Oxygen Extraction from Regolith using Ionic Liquids

Abstract: An important concern with long-duration manned space travel is the need to furnish enough materials to the vehicle, as well as the crew, for the duration of the mission. By extracting oxygen from the oxides present in regolith, we would be able to supply propellant and life support to the vehicle and the crew while in space, thereby limiting the amount of supplies needed prior to lift-off. Using a class of compounds known as ionic liquids, we have been able to lower the electrolysis operating temperature from 1600°C (molten oxide electrolysis) to less than 200°C, making this process much more feasible in terms of energy consumption and materials handling. To make this process ready for deployment into space, we have investigated what steps would be affected by the low-gravity environment. In the lab, the solubilization of lunar regolith simulant in ionic liquid produces water vapor that is normally distilled out of solution and subsequently electrolyzed for oxygen production. This distillation is not possible in space, so we have tested a method known as pervaporation and have suggested a way this technique could be incorporated into a reactor design.